



## ZC-24DI

CANopen/Modbus  
I/O Module  
24 Digital Input  
Or  
16 Digital input and  
8  
Counters (32 bit)



### User Manual



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## CANopen FEATURES

TECHNICAL DATA	
BAUD RATE	20, 50, 125, 250, 500, 800, 1000 Kbits/s
COUNTERS NR/TYPER	8 (32 bit) from input 1..8
MAX FREQUENCY FOR COUNTERS	10 kHz
TYPICAL ON/OFF DELAY	1 ms (with filter disabled)
CANopen TECHNICAL DATA	
NMT	SLAVE
ERROR CONTROL	NODE GUARDING
NODE ID	HW SWITCH OR SOFTWARE
NUMBER OF PDO	5 TX
PDO MODES	Event Triggered, Sync (cyclic), Sync (acyclic)
PDO MAPPING	VARIABLE
PDO LINKING	SUPPORTED
NUMBER OF SDO	1 SERVER
ERROR MESSAGE	YES
SUPPORTED APPLICATION	CiA 301 v4.02
LAYER	CiA 401 v2.01

## CANopen TPDOs TRANSMISSION

### TYPE SUPPORTED

OBJECT VALUE 0x180x sub 2	TRANSMISSION TYPE
0	Synchronous - acyclic
From 1 to 240	Synchronous - cyclic
255	Asynchronous

## CANopen PDOs MAPPING

OBJECTS FOR DEFAULT MAPPING				
PDO NR	COB-ID	MAPPED OBJECTS	INDEX	SUBINDEX
TDO1	0x40000180 + NodeId	Digital Input [1..8]	0x6000	1
		Digital Input [9..16]	0x6000	2
		Digital Input [17..24]	0x6000	3
		Overflow counter [1..8]	0x6000	4
TPDO 5	0x40000280 + NodeId	Counter 1 value	0x2210	1
		Counter 2 value	0x2210	2
TPDO 6	0x40000380 + NodeId	Counter 3 value	0x2210	3
		Counter 4 value	0x2210	4
TPDO 7	0x40000480 + NodeId	Counter 5 value	0x2210	5
		Counter 6 value	0x2210	6
TPDO 8	0x40000300 + NodeId	Counter 7 value	0x2210	7
		Counter 8 value	0x2210	8

Note that TPDO COB-ID must starts with 0x4



## CANopen EMERGENCY MESSAGE

The Emergency message is composed by:  
 2 bytes of EEC (Emergency error code)  
 1 bytes of ER (Error Register)  
 4 bytes MEF (Manufacturer Error Filled Objects (0x1200))

EMERGENCY MESSAGE						
BYTE0	BYTE1	BYTE2	BYTE3	BYTE4	BYTE5	BYTE6
EER		ER	MEF			

EEC	
CODE	DESCRIPTION
0x0000	No Error
0x1000	Generic error
0x4201	CPU Temperature over T_HIGH_HIGH
0x4202	CPU Temperature over T_HIGH
0x4203	CPU Temperature under T_LOW
0x8110	Communication Can Overrun
0x8120	Error Passive
0x8130	Life Guard Error
0x8140	Recovered From Bus Off
0xFF20	CPU Error

ER							
BIT7	BIT6	BIT5	BIT4	BIT3	BIT2	BIT1	BIT0
Generic	0	0	Temperature	Communication	0	0	Manufacture

Where if the bit is 0 means no error

## CANopen MANUFACTURER SPECIFIC PROFILE

If Hardware switches are in “from memory” mode the node address is selectable by **Object 0x2001**.

NODE ADDRESS (OBJECT 0X2001:)	
OBJECT VALUE	DESCRIPTION
0....127	Node Address

If Hardware switches are in “from memory” mode baud rate is selectable by **Object 0x2002**.

BAUDRATE ( OBJECT 0X2002)	
OBJECT VALUE	DESCRIPTION
1	20 Kbit/s
2	50 Kbit/s
3	125 Kbit/s
4	250 Kbit/s
5	500 Kbit/s
6	800 Kbit/s
7	1 Mbit/s

**Object 0x2030** can be used for monitoring the CPU temperature

CPU TEMPERATURE ( OBJECT 0X2030 )	
SUBINDEX	DESCRIPTION
1	Actual Temperature [°C/10]
2	Temperature for HOT STOP ERROR [°C/10] 95.0°
3	Temperature for HOT ERROR [°C/10] 90.0°
4	Temperature for COLD ERROR [°C/10] -25.0°

The HOT STOP Temperature sends in pre-operational the station.

The HOT ERROR and the COLD ERROR Temperature sends the Emergency Object.

The Object is Read Only

**Object 0X2051** is used to send commands to the station module.

CPU COMMAND (OBJECT 0X2051)	
COMMAND CODE	DESCRIPTION
0x5C0n	Force the preset value (object 0x2211) for counter n
0x5D0n	Force the reset for counter n
0x5E0n	Force the overflow reset (object 0x6000 sub 4)



**Object 0X2200** is used to customize the input filter.

FILTER PARAMETERS (OBJECT 0X2200)	
SUBINDEX	DESCRIPTION
1	Samples Number for filter (default 40)
2	Counter threshold for high level (default 20)
3	Counter threshold for low level (default 20)

For a high level sample the filter counter is incremented, otherwise for a low level the filter counter is decremented.

When the filter counter is greater or equal subindex2 the input is stated "high".  
 When the filter counter is lower or equal subindex3 the input is stated "low".  
 In between subindex2 and subindex3 no state is asserted (dead zone).

Note that the filter can be disabled by selecting:  
 Subindex 1 = 1  
 Subindex 2 = 0  
 Subindex 3 = 0

**Object 0x2210** stores the values of the 8 counters in 32 bit format.

DIGITAL COUNTERS ( OBJECT 0X2210)	
SUBINDEX	DESCRIPTION
1	Preset Counter 1 Value
2	Preset Counter 2 Value
3	Preset Counter 3 Value
4	Preset Counter 4 Value
5	Preset Counter 5 Value
6	Preset Counter 6 Value
7	Preset Counter 7 Value





## DIP-SWITCH CONFIGURATION



BAUD RATE (kbps)				ADDRESS							
1	2	3	SOFTWARE PROGRAMMED	4	5	6	7	8	9	10	SOFTWARE PROGRAMMED
CANopen		ModBus								00000001	ADD. 001
	20	2.4								00000010	ADD. 002
	50	4.8								00000011	ADD. 003
	125	9.6								00000100	ADD. 004
	250	19.2								00001001	ADD. 005
	500	38.4								00001011	ADD. 005
	800	57.6								.....	.....
	1000	115.2								11111111	ADD. 127

Type of communication		
Protocol	SW2	SW4
ModBus	<input type="checkbox"/>	<input type="checkbox"/>
CANopen	<input type="checkbox"/>	<input type="checkbox"/>



## CANopen LED DESCRIPTION

SERVICE (DIAGNOSTIC) LED DESCRIPTION		
LED	STATE	DESCRIPTION
 RUN	BLINKING	Pre-operational mode
	SINGLE FLASH	Stop mode
	ON	Operational mode
 ERROR	SINGLE FLASH	At least one error counter has reached or exceeded the warning level
	DOUBLE FLASH	GUARD Event
	TRIPLE FLASH	The SYNC hasn't received within the configured communication cycle timeout period
	ON	The CAN controller is bus OFF
	OFF	NO Error
 FAIL	ON BLINKING	Data receiving from RS232
 POWER	ON	Power Supply

INPUT LED DESCRIPTION		
LED	STATE	DESCRIPTION
 1...8	ON	Input [1..8] is high
	OFF	Input [1..8] is low
 9....24	ON	Input [9..24] is high
	OFF	Input [9..24] is low



## CANopen DIGITAL INPUT MANAGEMENT

**Object 0x6003** is used for Input Filter Configuration

FILTER CONSTANT INPUT (OBJECT 0X6003)	
SUBINDEX	DESCRIPTION
1	FILTER ENABLED FOR INPUT [1..8]
2	FILTER ENABLED FOR INPUT [9..16] READ ONLY
3	FILTER ENABLED FOR INPUT [17..24] READ ONLY

If the value of object 0x6003 subindex 1 is “0” all inputs from 1 to 8 are configured in counter mode, in other word counter mode switched ON.

If the value of object 0x6003 subindex 1 is not equal to “0” the counter mode is switched OFF.

**Object 0x6005** is used for Interrupt Enable:

If the value is “1” the station can generate a synchronous TxPDO (DEFAULT setting).

If the value is “0” the station can’t generate a synchronous TxPDO.

**Object 0x6007** is used as Digital Interrupt Mask Low to Hgh.

II_INTERRUPT MASK LOW TO HIGH (OBJECT 0X6007)	
SUBINDEX	DESCRIPTION
1	Interrupt mask on rising edge input [1..8]
2	Interrupt mask on rising edge input [9..16]
3	Interrupt mask on rising edge input [17..24]
4	Interrupt mask for counters overflow

For subindex form 1 to 3 if value is “1” than the generation of TxPDO on rising edge is enabled.

If subindex 4 value is “1” the generation of TxPDO on all 8 counters overflows is enabled.

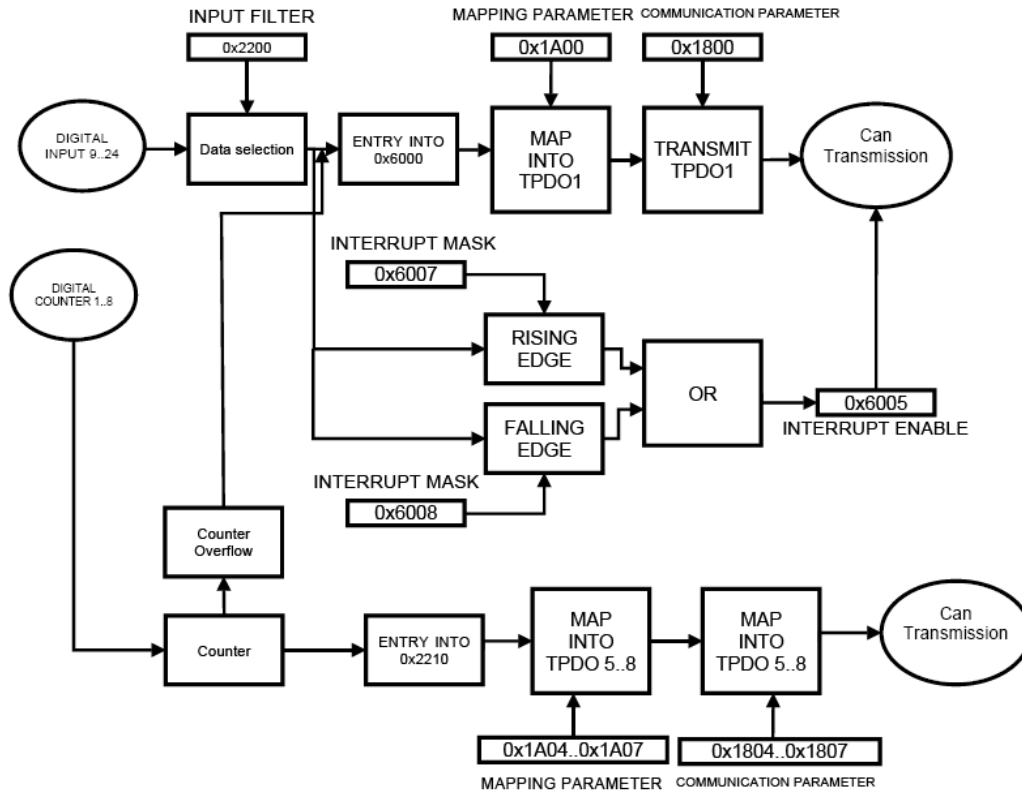
**Object 0x6008** is used as Digital Interrupt Mask High to Low.

II_INTERRUPT MASK HIGH TO LOW (OBJECT 0X6008)	
SUBINDEX	DESCRIPTION
1	Interrupt mask on falling edsge input [1..8]
2	Interrupt mask on falling edsge input [9..16]
3	Interrupt mask on falling edsge input [17..24]

For subindex form 1 to 3 if value is “1” than the generation of TxPDO on falling edge is enable

## CANopen FUNCTIONAL DIAGRAM

COUNTER MODE ON (Subindex 1 Object 0x6003 = '0')



## CANopen OBJECT DICTIONARY

### Communication Profile Area

INDEX	SUB INDEX	NAME	DESCRIPTION	TYPE	ACCESS	DEFAULT
0x1000	0	Device Type	Device Type (Profile 401 = 0x191)	UNSIGNED 32	RO	0x10191
0x1001	0	Error register	Error register (DS 401)	UNSIGNED 8	RO	0
0x1002	0	Manufacturer Status Register	Status Register	UNSIGNED 32	RO	0
0x1005	0	SYNC COB-ID	The device consumes the SYNC message	UNSIGNED 32	RW	0x80
0x1006	0	Communication Window Length	Sync interval [us]	UNSIGNED 32	RW	0
0x1007	0	Synchronous Window Length	Time window [us] for the PDO transmission after the SYNC	UNSIGNED 32	RW	0
0x1008	0	Manufacturer Device Name	Device name	VISIBLE STRING	RO	"ZC-24DI"
0x1009	0	Manufacturer Hardware version	Hardware version	VISIBLE STRING	RO	"SC000000"
0x100A	0	Manufacturer Software version	Software version	VISIBLE STRING	RO	"SW001170"
0x100C	0	Guard Time	Guard Time [ms]	UNSIGNED 16	RW	0
0x100D	0	Life Time Factor	Max delay between two guarding telegrams = Guard_Time*Life_Time_Factor	UNSIGNED 8	RW	0
0x1010	0	Store Parameters	Max Subindex Number		RO	4
	1	Save All Parameters	Store not volatile parameters (Write in ASCII "save" for store process MSB 0x65766173 LSB)	UNSIGNED 32	RW	1
	2	Save Communication Parameters	Store not volatile parameters (Write in ASCII "save" for store process MSB 0x65766173 LSB)	UNSIGNED 32	RW	1
	3	Save Application Parameters	Store not volatile parameters	UNSIGNED 32	RW	1
	4	Save Manufactures Parameters	Store not volatile parameters	UNSIGNED 32	RW	1
0x1011	0	Restore Default	Max Subindex Number	UNSIGNED 8	RO	4
	1	Restore All Parameters	Restore not volatile parameters (Write in ASCII "load" for load process MSB 0x64616F6C LSB)	UNSIGNED 32	RW	0
	2	Restore Communication Parameters	Restore not volatile parameters (Write in ASCII "load" for load process MSB 0x64616F6C LSB)	UNSIGNED 32	RW	0
	3	Restore Application Parameters	Restore not volatile parameters (Write in ASCII "load" for load process MSB 0x64616F6C LSB)	UNSIGNED 32	RW	0
	4	Restore Mnuufactures parameters	Restore not volatile parameters (Write in ASCII "load" for load process MSB 0x64616F6C LSB)	UNSIGNED 32	RW	0



INDEX	SUB INDEX	NAME	DESCRIPTION	TYPE	ACCESS	DEFAULT
0x1014	0	COB-ID Emergency Object	COB-ID for Emergency Object	UNSIGNED 32	RO	NODEID + 0x80
0x1018	0	Identity Object	Max Subindex Number	UNSIGNED 8	RO	4
	1	Vendor ID	Seneca srl	UNSIGNED 32	RO	0x00000249
	2	Product Code	ZC-24DI Machine ID Code	UNSIGNED 32	RO	0x00000020
	3	Revision Number	Revision	UNSIGNED 32	RO	0
	4	Serial Number	Serial Number Code	UNSIGNED 32	RO	0
0x1200	0	Server SDO Parameters	Max Subindex Number	UNSIGNED 8	RO	2
	1	Receive SDO COB-ID	COB-ID of Receive SDO	UNSIGNED 32	RO	NODEID + 0x600
	2	Transmit SDO COB-ID	COB-ID of Transmit SDO	UNSIGNED 32	RO	NODEID+0x580
0x1800	0	Transmit PDO1 Communication Parameters	Max Subindex Number	UNSIGNED 8	RO	3
	1	COB-ID	COB-ID of TxPDO1	UNSIGNED 32	RW	NODEID + 0x40000180
	2	Transmission Type	Transmission Type for TxPDO1 0x00 = Synchronous - acyclic 0x01 to 0xF0 = Synchronous- cyclic 0xFF = Asynchronous	UNSIGNED 8	RW	0xFF
	3	Inhibit Time	Min. delay for the next PDO (ms/10)	UNSIGNED 16	RW	0x0000
0x1804	0	Transmit PDO5 Communication Parameters	Max Subindex Number	UNSIGNED 8	RO	3
	1	COB-ID	COB-ID of TxPDO5	UNSIGNED 32	RW	NODEID + 0x40000280
	2	Transmission Type	Transmission Type for TxPDO5 0x00 = Synchronous - acyclic 0x01 to 0xF0 = Synchronous- cyclic 0xFF = Asynchronous	UNSIGNED 8	RW	0x01
	3	Inhibit Time	Min. delay for the next PDO (ms/10)	UNSIGNED 16	RW	0x0000
0x1805	0	Transmit PDO6 Communication Parameters	Max Subindex Number	UNSIGNED 8	RO	3
	1	COB-ID	COB-ID of TxPDO6	UNSIGNED 32	RW	NODEID + 0x40000380
	2	Transmission Type	Transmission Type for TxPDO6 0x00 = Synchronous - acyclic 0x01 to 0xF0 = Synchronous- cyclic 0xFF = Asynchronous	UNSIGNED 8	RW	0x01
	3	Inhibit Time	Min. delay for the next PDO (ms/10)	UNSIGNED 16	RW	0x0000
0x1806	0	Transmit PDO7 Communication Parameters	Max Subindex Number	UNSIGNED 8	RO	3



INDEX	SUB INDEX	NAME	DESCRIPTION	TYPE	ACCESS	DEFAULT
	1	COB-ID	COB-ID of TxPDO7	UNSIGNED 32	RW	NODEID + 0x40000480
	2	Transmission Type	Transmission Type for TxPDO7 0x00 = Synchronous - acyclic 0x01 to 0xF0 = Synchronous-cyclic 0xFF = Asynchronous	UNSIGNED 8	RW	0x01
	3	Inhibit Time	Min. delay for the next PDO (ms/10)	UNSIGNED 16	RW	0x0000
0x1807	0	Transmit PDO1 Communication Parameters	Max Subindex Number	UNSIGNED 8	RO	3
	1	COB-ID	COB-ID of TxPDO1	UNSIGNED 32	RW	NODEID + 0x40000300
	2	Transmission Type	Transmission Type for TxPDO1 0x00 = Synchronous - acyclic 0x01 to 0xF0 = Synchronous-cyclic 0xFF = Asynchronous	UNSIGNED 8	RW	0x01
	3	Inhibit Time	Min. delay for the next PDO (ms/10)	UNSIGNED 16	RW	0x0000
0x1A00	0	Transmit PDO1 Mapping	Max Subindex Number	UNSIGNED 8	RO	4
	1	Object NR1	First Object (default: Input 1..8)	UNSIGNED 32	RW	0x60000108 Object = 0x6000 Subindex = 1 Length = 8 bit
	2	Object NR2	Second Object (default: Input 9..16)	UNSIGNED 32	RW	0x60000208 Object = 0x6000 Subindex = 2 Length = 8 bit
	3	Object NR3	Third Object (default: Input 17..24)	UNSIGNED 32	RW	0x60000308 Object = 0x6000 Subindex = 3 Length = 8 bit
	4	Object NR4	Fourth Object (default: Counter Overflow)	UNSIGNED 32	RW	0x60000408 Object = 0x6000 Subindex = 4 Length = 8 bit
0x1A04	0	Transmit PDO5 Mapping	Max Subindex Number	UNSIGNED 8	RO	2
	1	Object NR1	First Object (default: Counter 1)	UNSIGNED 32	RW	0x22100120 Object = 0x2210 Subindex = 1 Length = 32 bit
	2	Object NR2	Second Object (default: Counter2)	UNSIGNED 32	RW	0x22100220 Object = 0x2210 Subindex = 2 Length = 32 bit





INDEX	SUB INDEX	NAME	DESCRIPTION	TYPE	ACCESS	DEFAULT
0x1A05	0	Transmit PDO6 Mapping	Max Subindex Number	UNSIGNED 8	RO	2
	1	Object NR1	First Object (default:: Counter 3)	UNSIGNED 32	RW	0x22100320 Object = 0x2210 Subindex = 3 Length = 32 bit
	2	Object NR2	Second Object (default:: Counter 4)	UNSIGNED 32	RW	0x22100420 Object = 0x2210 Subindex = 4 Length = 32 bit
0x1A06	0	Transmit PDO7 Mapping	Max Subindex Number	UNSIGNED 8	RO	2
	1	Object NR1	First Object (default: Counter 5)	UNSIGNED 32	RW	0x22100520 Object = 0x2210 Subindex = 5 Length = 32 bit
	2	Object NR2	Second Object (default: Counter 6)	UNSIGNED 32	RW	0x22100620 Object = 0x2210 Subindex = 6 Length = 32 bit
0x1A07	0	Transmit PDO8 Mapping	Max Subindex Number	UNSIGNED 8	RO	2
	1	Object NR1	First Object (default:: Counter 7)	UNSIGNED 32	RW	0x22100720 Object = 0x2210 Subindex = 7 Length = 32 bit
	2	Object NR2	Second Object (default: Counter 8)	UNSIGNED 32	RW	0x22100820 Object = 0x2210 Subindex = 8 Length = 32 bit
0x1A06	0	Transmit PDO7 Mapping	Max Subindex Number	UNSIGNED 8	RO	2
	1	Object NR1	First Object (default: Counter 5)	UNSIGNED 32	RW	0x22100520 Object = 0x2210 Subindex = 5 Length = 32 bit
	2	Object NR2	Second Object (default: Counter 6)	UNSIGNED 32	RW	0x22100620 Object = 0x2210 Subindex = 6 Length = 32 bit



### Manufacturer Profile Area

INDEX	SUB INDEX	NAME	DESCRIPTION	TYPE	ACCESS	DEFAULT
0x2001	0	Module Address	Station Address (only if dip switch 4,5,6,7,8,9,10 are OFF)	UNSIGNED 8	RW	127
0x2002	0	Buad Rate	Station Baud Rate (only if dip switch 1,2,3 are OFF) 1 = 20Kbps 2 = 50Kbps 3 = 125Kbps 4 = 250Kbps 5 = 500Kbps 6 = 800Kbps 7 = 1Mbps	UNSIGNED 8	RW	7
0x2030	0	Device Temperature	Max Subindex Number	UNSIGNED 8	RO	4
	1	Internal Temperature	Station internal Temperature [°C/10]	INTEGER 16	RO	0
	2	Hi Hi Temperature	Critical Hot Temperature (All operations Stop ) [°C/10]	INTEGER 16	RO	950
	3	Hi Temperature	Warning for Too Hot Temperature [°C/10]	INTEGER 16	RO	900
	4	Low Temperature	Critical Low Temperature (All operations Stop ) [°C/10]	INTEGER 16	RO	-250
0x2051	0	CPU Command	Command to execute Supported commands are: 0x5Cnn Force preset for counter mask nn 0x5Dnn Force reset for counter mask nn 0x5Enn Force overflow for counter mask nn	UNSIGNED 16	RW	0
0x2052	0	Aux Command	Reserved	UNSIGNED 16	RW	0
0x2200	0	Input Filter Parameter	Max Subindex Number	UNSIGNED 8	RO	3
	1	Filter Length	Number of samples to evaluate	UNSIGNED 8	RW	40
	2	Counter threshold for high level	If counter >= threshold_high input is stated "high"	UNSIGNED 8	RW	20
	3	Counter threshold for low level	If counter <= threshold_low input is stated "low"	UNSIGNED 8	RW	20
0x2210	0	Input Counters	Max Subindex Number	UNSIGNED 8	RO	8
	1	Counter 1 Value	Counter 1 value	UNSIGNED 32	RW	0
	2	Counter 2 Value	Counter 2 value	UNSIGNED 32	RW	0
	3	Counter 3 Value	Counter 3 value	UNSIGNED 32	RW	0
	4	Counter 4 Value	Counter 4 value	UNSIGNED 32	RW	0



INDEX	SUB INDEX	NAME	DESCRIPTION	TYPE	ACCESS	DEFAULT
	5	Counter 5 Value	Counter 5 value	UNSIGNED 32	RW	0
	6	Counter 6 Value	Counter 6 value	UNSIGNED 32	RW	0
	7	Counter 7 Value	Counter 7 value	UNSIGNED 32	RW	0
	8	Counter 8 Value	Counter 8 value	UNSIGNED 32	RW	0
0x2211	0	Preset for Input Counters	Max Subindex Number	UNSIGNED 8	RO	8
	1	Counter 1 Preset Value	Counter 1 preset value	UNSIGNED 32	RW	0
	2	Counter 2 Preset Value	Counter 1 preset value	UNSIGNED 32	RW	0
	3	Counter 3 Preset Value	Counter 1 preset value	UNSIGNED 32	RW	0
	4	Counter 4 Preset Value	Counter 1 preset value	UNSIGNED 32	RW	0
	5	Counter 5 Preset Value	Counter 1 preset value	UNSIGNED 32	RW	0
	6	Counter 6 Preset Value	Counter 1 preset value	UNSIGNED 32	RW	0
	7	Counter 7 Preset Value	Counter 1 preset value	UNSIGNED 32	RW	0
	8	Counter 8 Preset Value	Counter 1 preset value	UNSIGNED 32	RW	0

### Standard Device Profile Area

INDEX	SUB INDEX	NAME	DESCRIPTION	TYPE	ACCESS	DEFAULT
0x6000	0	8 bit Digital Input Counter 1 overflow	Max Subindex Number	UNSIGNED 8	RO	4
	1	Input [1..8] Value	Read input [1..8] value	UNSIGNED 8	RO	0
	2	Input [9..16] Value	Read input [9..16] value	UNSIGNED 8	RO	0
	3	Input [17..24] Value	Read input [17..24] value	UNSIGNED 8	RO	0
	4	Counter [1..8] overflow	Overflow Status Counter [1..8]	UNSIGNED 8	RO	0
0x6003	0	Filter Mask Enable	Max Subindex Number	UNSIGNED 8	RO	3
	1	Input [1..8] Filter Mask Enable	Input [1..8] Filter enable Mask bit 0 = Filter disabled (and Counters 1..8 Enabled) Mask bit 1 = Filter enabled (and Counters 1..8 Disabled)	UNSIGNED 8	RW	0xFF
	2	Input [9..16] Filter Mask Enable	Input [9..16] Filter Mask enable	UNSIGNED 8	RO	0xFF
	3	Input [17..24] Filter Mask Enable	Input [17..24] Filter Mask enable	UNSIGNED 8	RO	0xFF



INDEX	SUB INDEX	NAME	DESCRIPTION	TYPE	ACCESS	DEFAULT
0x6005	0	Global Interrupt Enabled	0 = TxPDO Asynchronous disabled 1 = TxPDO Asynchronous enabled	UNSIGNED 8	RW	1
0x6007	0	Interrupt Mask Low to High	Max Subindex Number	UNSIGNED 8	RO	4
	1	Input [1..8] interrupt Low to High mask enable	Input [1..8] rising interrupt mask enable Mask bit 0 = rising interrupt disabled Mask bit 1 = rising interrupt enabled	UNSIGNED 8	RW	0xFF
	2	Input [9..16] interrupt Low to High mask enable	Input [9..16] rising interrupt mask enable Mask bit 0 = rising interrupt disabled Mask bit 1 = rising interrupt enabled	UNSIGNED 8	RW	0xFF
	3	Input [17..24] interrupt Low to High mask enable	Input [17..24] rising interrupt mask enable Mask bit 0 = rising interrupt disabled Mask bit 1 = rising interrupt enabled	UNSIGNED 8	RW	0xFF
	4	Counter [1..8] Overflow interrupt mask enable	Counter [1..8] rising interrupt mask enable Mask bit 0 = rising interrupt disabled Mask bit 1 = rising interrupt enabled	UNSIGNED 8	RW	0xFF
0x6008	0	Interrupt Mask High to Low	Max Subindex Number	UNSIGNED 8	RO	3
	1	Input [1..8] interrupt High to Low mask enable	Input [1..8] falling interrupt mask enable Mask bit 0 = falling interrupt disabled Mask bit 1 = falling interrupt enabled	UNSIGNED 8	RW	0xFF
	2	Input [9..16] interrupt High to Low mask enable	Input [9..16] falling interrupt mask enable Mask bit 0 = falling interrupt disabled Mask bit 1 = falling interrupt enabled	UNSIGNED 8	RW	0xFF
	3	Input [17..24] interrupt High to Low mask enable	Input [17..24] falling interrupt mask enable Mask bit 0 = falling interrupt disabled Mask bit 1 = falling interrupt enabled	UNSIGNED 8	RW	0xFF
	3	Input [17..24] interrupt High to Low mask enable	Input [17..24] falling interrupt mask enable Mask bit 0 = falling interrupt disabled Mask bit 1 = falling interrupt enabled	UNSIGNED 8	RW	0xFF
0x6020	0	Read Input 1 Bit	Max Subindex Number	UNSIGNED 8	RO	24



INDEX	SUB INDEX	NAME	DESCRIPTION	TYPE	ACCESS	DEFAULT
	1	Input 1 Value	0 = Input is "Low" 1 = Input is "High"	UNSIGNED 8	RO	0
	2	Input 2 Value	0 = Input is "Low" 1 = Input is "High"	UNSIGNED 8	RO	0
	3	Input 3 Value	0 = Input is "Low" 1 = Input is "High"	UNSIGNED 8	RO	0
	4	Input 4 Value	0 = Input is "Low" 1 = Input is "High"	UNSIGNED 8	RO	0
	5	Input 5 Value	0 = Input is "Low" 1 = Input is "High"	UNSIGNED 8	RO	0
	6	Input 6 Value	0 = Input is "Low" 1 = Input is "High"	UNSIGNED 8	RO	0
	7	Input 7 Value	0 = Input is "Low" 1 = Input is "High"	UNSIGNED 8	RO	0
	8	Input 8 Value	0 = Input is "Low" 1 = Input is "High"	UNSIGNED 8	RO	0
	9	Input 9 Value	0 = Input is "Low" 1 = Input is "High"	UNSIGNED 8	RO	0
	10	Input 10 Value	0 = Input is "Low" 1 = Input is "High"	UNSIGNED 8	RO	0
	11	Input 11 Value	0 = Input is "Low" 1 = Input is "High"	UNSIGNED 8	RO	0
	12	Input 12 Value	0 = Input is "Low" 1 = Input is "High"	UNSIGNED 8	RO	0
	13	Input 13 Value	0 = Input is "Low" 1 = Input is "High"	UNSIGNED 8	RO	0
	14	Input 14 Value	0 = Input is "Low" 1 = Input is "High"	UNSIGNED 8	RO	0
	15	Input 15 Value	0 = Input is "Low" 1 = Input is "High"	UNSIGNED 8	RO	0
	16	Input 16 Value	0 = Input is "Low" 1 = Input is "High"	UNSIGNED 8	RO	0
	17	Input 17 Value	0 = Input is "Low" 1 = Input is "High"	UNSIGNED 8	RO	0
	18	Input 18 Value	0 = Input is "Low" 1 = Input is "High"	UNSIGNED 8	RO	0
	19	Input 19 Value	0 = Input is "Low" 1 = Input is "High"	UNSIGNED 8	RO	0
	20	Input 20 Value	0 = Input is "Low" 1 = Input is "High"	UNSIGNED 8	RO	0
	21	Input 21 Value	0 = Input is "Low" 1 = Input is "High"	UNSIGNED 8	RO	0
	22	Input 22 Value	0 = Input is "Low" 1 = Input is "High"	UNSIGNED 8	RO	0
	23	Input 23 Value	0 = Input is "Low" 1 = Input is "High"	UNSIGNED 8	RO	0
	24	Input 24 Value	0 = Input is "Low" 1 = Input is "High"	UNSIGNED 8	RO	0



## MODBUS FEATURES

### TECHNICAL DATA

BAUD RATE	2.4, 4.8, 9.6, 19.2, 38.57.6, 115.2 Kbits/s
COUNTERS NR/TYPER	8 (32 bit) from input 1..8
MAX FREQUENCY FOR COUNTERS	10 kHz

## DIP-SWITCH CONFIGURATION





BAUD RATE (Kbps)			ADDRESS							SOFTWARE PROGRAMMED		
1	2	3	4	5	6	7	8	9	10			
0	0	0	0	0	0	0	0	0	0	0000000		
0	0	0	0	0	0	0	0	0	0	0000001	ADD. 001	
0	0	0	0	0	0	0	0	0	0	0000010	ADD. 002	
0	0	0	0	0	0	0	0	0	0	0000011	ADD. 003	
0	0	0	0	0	0	0	0	0	0	0000100	ADD. 004	
0	0	0	0	0	0	0	0	0	0	0000101	ADD. 005	
0	0	0	0	0	0	0	0	0	0	.....		
0	0	0	0	0	0	0	0	0	0	1111111	ADD. 127	

Type of communication		
Protocol	SW2	SW4
ModBus	<input type="checkbox"/>	<input type="checkbox"/>
CANopen	<input type="checkbox"/>	<input type="checkbox"/>



ModBus TERMINATOR	
SW3	State
<input type="checkbox"/>	ENABLE
<input type="checkbox"/>	DISABLE

## MODBUS LED DESCRIPTION

### SERVICE LED DESCRIPTION

LED	STATE	DESCRIPTION
 RUN/TX	ON	Data Transmission
 ERR/RX	ON	Data Receiving
 FAIL	ON BLINKING	Data receiving from RS232
 POWER	ON	Power Supply

### INPUT LED DESCRIPTION

LED	STATE	DESCRIPTION
 1...8	ON	Input [1..8] is high
	OFF	Input [1..8] is low
 9....24	ON	Input [9..24] is high
	OFF	Input [9..24] is low

## MODBUS REGISTERS

### Holding Registers

ADDRESS	REGISTER	DESCRIPTION	TYPE	ACCESS	DEFAULT
40001	MACH-ID/EXT_FW_REV	machine id = 0x20 ext revision 1	FLASH	R	0x2001
40002	FW_CODE	Seneca FW Code	FLASH	R	CODE
40003	INPUT 1..8	Input 1...8	RAM	R	0
40004	INPUT 9..16	Input 9...16	RAM	R	0
40005	INPUT 17..24	Input 17...24	RAM	R	0
40006	STATUS	Status	RAM	R	0
40007	COUNTER_OVERFLOW	Counter overflow 1 = Enable 0 = Disable	RAM	R	0
40008	COUNTER1_H	Counter1_high word	RAM	R	0
40009	COUNTER1_L	Counter1_low word	RAM	R	0
40010	COUNTER2_H	Counter2_high word	RAM	R	0
40011	COUNTER2_L	Counter2_low word	RAM	R	0



ADDRESS	REGISTER	DESCRIPTION	TYPE	ACCESS	DEFAULT
40012	COUNTER3_H	Counter3_high word	RAM	R	0
40013	COUNTER3_L	Counter3_low word	RAM	R	0
40014	COUNTER4_H	Counter4_high word	RAM	R	0
40015	COUNTER4_L	Counter4_low word	RAM	R	0
40016	COUNTER5_H	Counter5_high word	RAM	R	0
40017	COUNTER5_L	Counter5_low word	RAM	R	0
40018	COUNTER6_H	Counter6_high word	RAM	R	0
40019	COUNTER6_L	Counter6_low word	RAM	R	0
40020	COUNTER7_H	Counter7_high word	RAM	R	0
40021	COUNTER7_L	Counter7_low word	RAM	R	0
40022	COUNTER8_H	Counter8_high word	RAM	R	0
40023	COUNTER8_L	Counter8_low word	RAM	R	0
40024	FILTER MASK [1..8]	Input 1..8 Filter Mask => filtrate counters	FLASH	R/W	0xFF
40025	FILTER MASK [9..16]	Input 9..16 Filter Mask	FLASH	R	0xFF
40026	FILTER MASK [17..24]	Input 17..24 Filter Mask	FLASH	R	0xFF
40027	FILTER_SAMPLES_NR	Default filter: It operates for frequency > 100 Hz	FLASH	R/W	0x28
40028	FILTER_HIGH_SAMPLES	(0...255)	FLASH	R/W	0x14
40029	FILTER_LOW_SAMPLES	(0...255)	FLASH	R/W	0x14
40030	PRESET_COUNTER1_H	Preset Counter value = 0	FLASH	R/W	0
40031	PRESET_COUNTER1_L		FLASH	R/W	0
40032	PRESET_COUNTER2_H	Preset Counter value = 0	FLASH	R/W	0
40033	PRESET_COUNTER2_L		FLASH	R/W	0
40034	PRESET_COUNTER3_H	Preset Counter value = 0	FLASH	R/W	0
40035	PRESET_COUNTER3_L		FLASH	R/W	0
40036	PRESET_COUNTER4_H	Preset Counter value = 0	FLASH	R/W	0
40037	PRESET_COUNTER4_L		FLASH	R/W	0
40038	PRESET_COUNTER5_H	Preset Counter value = 0	FLASH	R/W	0
40039	PRESET_COUNTER5_L		FLASH	R/W	0
40040	PRESET_COUNTER6_H	Preset Counter value = 0	FLASH	R/W	0
40041	PRESET_COUNTER6_L		FLASH	R/W	0
40042	PRESET_COUNTER7_H	Preset Counter value = 0	FLASH	R/W	0
40043	PRESET_COUNTER7_L		FLASH	R/W	0
40044	PRESET_COUNTER8_H	Preset Counter value = 0	FLASH	R/W	0
40045	PRESET_COUNTER8_L		FLASH	R/W	0
40046	ADDR CAN	CANOpen Address 127	FLASH	R/W	0x7F
40047	BAUD CAN	CANOpen Baudrate 20 kbps	FLASH	R/W	1
40048	ADDR/PARITY MODBUS	Modbus Address 1, no parity	FLASH	R/W	0x0100
40049	BAUD/DELAY MODBUS	Modbus Baudrate 38400, no delay	FLASH	R/W	0x0500
40201	COMMAND		RAM	R/W	0
40202	COMMAND_AUX	Service register for COMMAND	RAM	R	0
40301	INPUTS [1..16]		RAM	R	0
40302	INPUTS [17..24]		RAM	R	0



## Status

This register contains the states of over-temperature and flash errors:

STATUS							
BIT7	BIT6	BIT5	BIT4	BIT3	BIT2	BIT1	BIT0
FLASH_ERROR	0	0	0	TEMP_ERROR	0	0	0

## Filters

For a high input level the filter counter is incremented, otherwise for a low level the filter counter is decremented.

When the filter counter is greater or equal than FILTER\_HIGH\_SAMPLE the input is stated "High".  
 When the filter counter is lower or equal than FILTER\_LOW\_SAMPLE the input is stated "Low".  
 Between FILTER\_HIGH\_SAMPLE and FILTER\_LOW\_SAMPLE no state is asserted (dead zone).

Note that the filter can be disabled by selecting:

FILTER\_HIGH\_SAMPLE\_NR = 1  
 FILTER\_LOW\_SAMPLE = 0  
 FILTER\_HIGH\_SAMPLE = 0

## Command Modbus

COMMAND	
COD	DESCRIPTION
0x5Cnn	Force Preset of counters corresponding to bits nn. (Preset value is in registers 40030-40045)
0x5Dnn	Force Reset of counters corresponding to bits nn
0x5Enn	Force reset bit overflow (COUNTER_OVERFLOW) corresponding to bits nn
0xBCD0	Save data in FLASH
0xC1A0	Reset Module





### Coil Registers

ADDRESS	REGISTER	DESCRIPTION	TYPE	ACCESS	DEFAULT
10001	INPUT1	Input1	RAM	R	0
10002	INPUT2	Input2	RAM	R	0
10003	INPUT3	Input3	RAM	R	0
10004	INPUT4	Input4	RAM	R	0
10005	INPUT5	Input5	RAM	R	0
10006	INPUT6	Input6	RAM	R	0
10007	INPUT7	Input7	RAM	R	0
10008	INPUT8	Input8	RAM	R	0
10009	INPUT9	Input9	RAM	R	0
10010	INPUT10	Input10	RAM	R	0
10011	INPUT11	Input11	RAM	R	0
10012	INPUT12	Input12	RAM	R	0
10013	INPUT13	Input13	RAM	R	0
10014	INPUT14	Input14	RAM	R	0
10015	INPUT15	Input15	RAM	R	0
10016	INPUT16	Input16	RAM	R	0
10017	INPUT17	Input17	RAM	R	0
10018	INPUT18	Input18	RAM	R	0
10019	INPUT19	Input19	RAM	R	0
10020	INPUT20	Input20	RAM	R	0
10021	INPUT21	Input21	RAM	R	0
10022	INPUT22	Input22	RAM	R	0
10023	INPUT23	Input23	RAM	R	0
10024	INPUT24	Input24	RAM	R	0

